

Idaho Department of Health and Welfare

Division of Health

Bureau of Laboratories

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About the Bureau of Labs

Who are we?

The Idaho Bureau of Laboratories is the analytical arm of the Division of Health. When there is a need for laboratory work in support of public health clinics, water pollution studies, drinking water protection, food protection, among other activities of IDHW, the lab does those tests. The Lab is mandated to support state and local health departments in their duties and supply testing which supports and confirms private physicians and clinical laboratory efforts. When these entities require a test that is too uncommon or require a second opinion or confirmation in regards to a sample, the lab is ready to help. In addition, this facility provides training for laboratorians and insures the quality of environmental and medical testing laboratories through an inspection and licensing program. There are between 35 to 40 scientists, technicians, laboratory inspectors, and support staff performing these activities.

Where did we come from?

In 1904 the legislature enabled the establishment of the precursor to the present Bureau of Laboratories. The State Dairy and Pure Food Commission suggested that "A State Chemist be employed and a laboratory established". Since the Board of Health was not established until 1919, the Bureau of Labs is probably one of the oldest sections in the Department of Health and Welfare. It is also, with the possible exception of early mining assay laboratories, one of the oldest laboratory entities in the state.

Other state laboratories have "spun off" from the Bureau. The milk testing which was one of our original functions has been moved to the Department of Agriculture. In the early 1960s, we began doing limited forensic testing for the law enforcement agencies in Idaho. From then, into the 1980s this effort became a full-fledged forensic laboratory. That laboratory was moved to Department of Law Enforcement (DLE). It is now in Meridian, at DLE's central facility there.

What are we doing?

The Idaho Bureau of Laboratories performs a wide variety of chemical and microbiological analyses. See the Analytical Services Pages for a complete list.

Where are we going?

The Idaho Bureau of Laboratories is constantly looking for better ways to uncover and identify health threats. Current efforts include utilizing new and rapidly evolving methods in molecular

biology. The laboratory is currently investigating methods for DNA sequence detection and typing for Norovirus. This gastrointestinal virus can cause widespread illness, as has been witnessed by the Cruise industry over the past three years. Utilizing a DNA sequencer, we can identify and classify outbreaks of *Norovirus* more specifically and accurately. In addition, past research using Polymerase Chain Reaction (PCR) methods for the detection of shigatoxins, a group of toxins in *E. coli*, the *Cholera vibrio*, and *Shigella* species that cause dysentery, were successful in helping to detect and determine food related outbreaks in pepperoni. These techniques have shown that not all dangerous *E. coli* in Idaho belongs to the infamous O157:H7 serotype. The laboratory has developed, and is in the process of developing and validating PCR techniques for the detection of bacteria and viruses that are difficult to grow, but which pose significant public health risks. Some of the PCR related tests that we currently use are: *Bordetella pertussis* (Whooping cough), *Norovirus*, *West Nile Virus*, and many zoonotic diseases that could be used as agents of bioterrorism like, anthrax and plague.

The Idaho Public Health Laboratory

The Bureau of Laboratories consists of one centralized laboratory in the state capitol, Boise. This laboratory serves as a clinical reference laboratory and analytical lab for the seven Public Health Districts in the state, the state's Hospitals and Physicians, the Idaho Department of Environmental Quality, the Department of Homeland Security, the Federal Bureau of Investigation, the Idaho State Police and the Bureau of Hazardous Materials and the citizens of Idaho.

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The Idaho Bureau of Laboratories is composed of seven sections:

LABORATORY ADMINISTRATION SECTION

Section Manager: Margarita Santos (208) 334-2235 ext. 224

In addition to administrative services, we provide supplies, shipping and receiving, and budget support to the lab sections. This section also, helps in support of the districts and other clientele by shipping testing kits, forms and acts as a packaging and shipping resource for the state.

VIROLOGY AND SEROLOGY SECTION

Program Manager: Colleen Greenwalt (208) 334-2235 ext. 228

The Virology and Serology section is responsible for a majority of the Sexually Transmitted disease testing, Respiratory and Gastrointestinal Virus testing and new and emerging virus testing. They also conduct assays for the detection of a number of other agents including Rabies, Hantavirus and West Nile Virus.

MICROBIOLOGY SECTION

Program Manager: Walt DeLong (208) 334-2235 ext. 252

The Microbiology section probably does most of the testing traditionally associated with public health. This section identifies the agents of bacterial, parasitic, and fungal communicable diseases. Microbiology also tests drinking water, recreational water,

and other surface waters for pathogens and biological contaminants. In addition, the microbiology section also tests foods for bacterial agents of food poisoning and adulterants. Certification of private, environmental laboratories for bacterial contaminants, under the direction and auspices of EPA, is conducted by this section

CHEMISTRY SECTION

Program Manager: Wally Baker (208) 334-2235 ext. 233

The Chemistry section is responsible for analysis of organic and inorganic chemicals, and residues found in water, soils, food products, and hazardous materials. They work closely with the Idaho Department of Environmental Quality, the seven public health districts and the Bureau of Hazardous Materials.

LABORATORY IMPROVEMENT SECTION

Program Manager: David Eisentrager (208) 334-2235 ext. 245

Laboratory Improvement is the section responsible for registering and certifying all clinical laboratories performing laboratory testing in Idaho. They enforce the CLIA regulations by inspection of qualifying labs every two years. X-ray inspections and educational efforts also are included in the responsibilities of this section.

Analytical Methods in Virology and Serology

Pathogen, Test Type or Disease	Tests or Methods	Sample Required (blood, serum...etc)	Minimum Volume Required	Special Collection Procedures (Viral transport media)	Turn-around Time
Adenovirus, IgM & IgG antibody	Serology by IFA	serum	0.5 ml		1 day
Adenovirus, antigen	Viral Culture	throat or NP	Swab or 1 ml aspirate/wash	swab in viral transport (dry swab, wood swab, and calcium alginate swabs are unacceptable)	14 days for neg culture
Adenovirus, antigen	DFA	NP	1 ml aspirate or wash	swab in viral transport (dry swab, wood,swab, and calcium alginate swabs are unacceptable)	1 day for DFA
Adenovirus, Enteric antigen	EIA	stool	1 ml or rectal swab		1 day
Arbovirus, IgM/IgG antibody:					
1. West Nile Virus	Serology by EIA	Serum or CSF	0.5 ml		3 days
2. St. Louis Encephalitis	Serology by EIA	Serum or CSF	0.5 ml		3 days
Arbovirus, antigen					
1. West Nile Virus	rt-PCR	Mosquitoes & birds		oral swab on corvids, tissue on raptors, mosquitoes collected by trapping	1 day for birds, 2 days for mosquitoes
2. St. Louis Encephalitis	rt-PCR	Mosquitoes		Same as above	
3. Western Equine Encephalitis	Rt-PCR	Mosquitoes		Same as above	

Chlamydia trachomatis, antigen	Nucleic acid probe & Target Amplification	Endocervical urethral swab or urine		Gen-Probe specific collection kit	Probe (daily) TMA (3 x week)
Chlamydia group, IgM & IgG antibody	Serology by IFA	serum	0.5 ml		1 day
Cytomegalovirus, IgM & IgG antibody	Serology by IFA	serum	0.5 ml		1 day
Enterovirus: Coxsackie, Echovirus, Enterovirus, Polio	Viral Culture	Stool, CSF, Throat	1ml stool 0.5ml CSF throat swab	swab in viral transport (dry swab, wood swab, and calcium alginate swabs are unacceptable)	14 days for neg
Hantavirus IgM & IgG antibody	Serology by EIA	serum	0.5ml	call ahead for 1 day turn around	2 days
Hantavirus, rodent total antibody	Serology by EIA	whole blood	prior consultation	Survey studies only, no single rodents	
Hepatitis A, IgM antibody	Serology by EIA	serum	0.5 ml		2 days
Hepatitis B Surface Antigen	Serology by EIA	serum	1.5 ml	Plasma is acceptable	1 x per week
Hepatitis B Surface Antibody	Serology by EIA	serum	0.5 ml	Plasma is acceptable	1 x per week
Hepatitis B Core Total Ab	Serology by EIA	serum	0.5 ml	Plasma is acceptable	1 x per week
Hepatitis C Antibody	Serology by EIA	serum	0.5 ml	Plasma is acceptable	1 x per week
Herpes Simplex Virus, HSV I or HSV II	Viral Culture	lesion	Vesicular swab	Swab in viral transport (dry swab, wood swab, & calcium alginate swabs are unacceptable)	7 days for neg
Herpes Simplex, IgM & IgG antibody	Serology by IFA	serum	0.5 ml		1 day

Human Immunodeficiency Virus	Serology by EIA & Western Blot	serum	0.5 ml	Plasma acceptable	2 x per week, 1 day if exposure
Influenza A & B Virus,antigen	Viral Culture	NP or Throat	Aspirate/wash or swab	swab in viral transport (dry swab, wood,swab, and calcium alginate swabs are unacceptable)	14 days for neg culture
Influenza A & B Virus,antigen	DFA	NP	Aspirate/wash or swab	Swab in viral transport	1 day
Influenza A & B, IgM & IgG antibody	Serology by IFA	serum	0.5 ml		1 day
Mumps IgG & IGM antibody	Serology by IFA	serum	0.5 ml		1 x per week IgM upon request
Mycoplasma pneumonia, IgM & IgG antibody	Serology by IFA	serum	0.5 ml		1 day
Neisseria gonorrhoeae	Nucleic acid probe	Endocervical or Urethral swab		Gen-Probe specific collection kit	3 x per week
NoroVirus (Norwalk), antigen	PCR	stool, vomitis	20 ml stool, 10 ml vomitis	outbreak investigations only	2 days
Parainfluenza Virus 1,2,& 3, antigen	Viral Culture	throat, NP	swab or 1 ml aspirate /wash	swab in viral transport (dry swab, wood swab, and calcium alginate swabs are unacceptable)	14 days for neg
Parainfluenza Virus 1,2, & 3 antigen	DFA	NP	Swab or 1 ml aspirate/wash	swab in viral transport	1 day for DFA
Parainfluenza Virus 1,2, & 3 IgM & IgG antibody	Serology by IFA	serum	0.5 ml		1 day
Rabies antigen	IFA	brain tissue	head, whole body if under 8 lbs.	brain removed by Animal Health Lab	1 day

Respiratory Syncytial Virus, antigen	Viral Culture	throat, NP	swab or 1 ml aspirate/wash	swab in viral transport (dry swab, wood swab, and calcium alginate swabs are unacceptable)	14 days for neg
Respiratory Syncytial Virus, antigen	DFA	NP	Swab or aspirate/wash	Swab in viral transport	1 day
Respiratory Syncytial Virus, IgM & IgG antibody	Serology by IFA	serum	0.5 ml		1 day
Rotavirus, antigen	EIA	stool	1 ml or rectal swab		1 day
Rubella, IgM & IgG antibody	Serology by EIA	serum	0.5 ml	also called German or 3-day measles	IgG 1 x per week, IgM upon request
Rubeola, IgM & IgG antibody	Serology by EIA	serum	0.5 ml	also called measles, hard, red, 10-day	IgG 1 x per week, IgM upon request
SARS, total antibody	Serology by EIA	serum	1 ml	call ahead, acute & 28 day convalescent	1 day
SARS, antigen	rt-PCR	upper resp., blood, serum, stool	prior consultation required	prior consultation required	1 day for preliminary
Syphilis (Treponema pallidum)	USR, TPPA	serum	0.5 ml		2 x week, TPPA 1 x week
Syphilis (Treponema pallidum)	VDRL	CSF	0.5 ml		1 x per week
Varicella zoster, IgG, IgM antibody	Serology by EIA & IFA	serum	0.5 ml		1 x per week, IgM upon request
Varicella zoster, antigen	Viral culture	lesion	vesicular swab or fluid	swab in viral transport (dry swab, wood swab, and calcium alginate swabs are unacceptable)	14 days for neg

Varicella zoster, antigen	DFA	lesion	swab in viral transport		1 day
Varicella zoster, antigen	Real-Time PCR	lesion	vesicular swab or scab or dried vesicular fluid on slide	prior consultation required (cotton or polyester swab only)	1 day

Explanation of Tests:

<u>Code</u>	<u>Explanation</u>	<u>Code</u>	<u>Explanation</u>
DFA	Direct Fluorescent Antibody	RT-PCR	Reverse Transcriptase Polymerase Chain Reaction
EIA	Enzyme-linked Immunosorbent Assay	Real-Time PCR	Real-Time Polymerase Chain Reaction
IFA	Indirect Fluorescent Antibody		
USR	Unheated serum reagin, qualitative & quantitative		
TPPA	Treponemal Passive Particle Agglutination		

Analytical Methods in Clinical Microbiology

Pathogen, Test Type or Disease	Tests or Methods	Sample Required (blood, serum...etc)	Minimum Volume Required	Special Collection Procedures (Special transport media)	Turn-around Time
General Bacteriology					
<i>Legionella</i>	CC,EC,CON*,DFA*	Sputum (preferred), BAL	5-10 ml	First morning sputum, Store and Ship refrigerated	48-72 hrs
<i>Diphtheria.</i>	CC,ID,TT	NP and throat swab		Sterile container or routine transport media, keep refrigerated	48 hrs
<i>Pertussis, culture</i>	CC	Nasopharyngeal swab	Use Dacron or calcium alginate swab (if culture only)	Place swab in Regan-Lowe transport media and transport within 48hrs; keep at room temp-- DO NOT REFRIGERATE	10 days
<i>Pertussis, PCR</i>	PCR	Nasopharyngeal swab	Use Dacron swab (do not use Calgiswab)	Place swab in sterile dry tube provided w/Kits	48-72 hrs
<i>Pertussis, DFA</i>	DFA	Microscope slide of material from NP swab	Dacron or Calgiswab	Roll swab after collection onto slide, air dry, do not fix, room temperature	48 hrs
<i>Reference cultures</i>		Pure culture, submitted on agar slant		Ship at room temperature	48 hrs – 10 days
<i>Nosocomial Isolates for outbreak studies</i>		Contact lab			

<i>Leptospirosis</i>		Contact lab			
<i>Streptococcus</i>	AS,CC,EC,ST, CON,ID,GT	Pure culture	Submit on agar slant	Store and ship at room temperature.	48 -72 hrs
<i>Staphylococcus</i>	AS,CC,EC,CON, ID,TT,GT	Nasal Swab, pure culture on slant-	Sterile culture;swab in transport media	Store and ship at room temperature.	48 -72 hrs
<i>Yersinia pestis (Plague)</i>	CC,EC,DFA*, CON*,GT	Culture specimen sent on Chocolate or blood agar slant		Label culture tube; package and ship according to IATA or USPS regulations	24-48 hrs
<i>Haemophilus influenzae</i>	CC,CON,ID,ST,GT	Culture specimen sent on Chocolate or blood agar slant		Label culture tube; package and ship according to IATA or USPS regulations	24-48 hrs
<i>Neisseria meningitidis</i>	CC,CON,ID,ST,GT	Pure culture isolate sent on TSA, BHI or blood agar slant		Label culture tube; package and ship according to IATA or USPS regulations	24-48 hrs
Diarrheal Diseases					
<i>Salmonella</i>	AS,CC,EC,CON,ID, ST,GT	Pure culture isolate sent on TSA, BHI or blood agar slant		Store and ship at room according to IATA or USPS regulations temperature; packaged	48 hrs
<i>Shigella</i>	AS,CC,EC,CON,ID, ST,GT	Pure culture isolate sent on TSA, BHI or blood agar slant		Store and ship at room according to IATA or USPS regulations temperature; packaged	48 hrs

<i>Vibrio</i>	CC,EC,CON,ID,ST,GT	Feces, vomitus, food or pure culture		Transport specimens in CaryStore and ship at room temperature	48-72 hrs
<i>Bacillus cereus</i>	CC,EC,CON,TT,GT	Implicated food or stool, pure culture	Food	Transport at room temperature	48-72 hrs
**Clostridium botulinum	CC*,TT*	Suspect food in original container, stool, serum	Stool -1 gm (culture); 25g for toxin; Serum- 5mls	Notify local Health Dist. And Idaho State Epidemiologist; contact State Laboratory; keep specimens refrigerated	4 working days
<i>Campylobacter</i>	CC,EC,GP,GT	Stool in fecal transport media or pure culture	>5ml or 5 g stool, or one swab	Store and ship at room temperature transport to lab in 2 hrs.	48-72 hrs
<i>Clostridium perfringens</i>	CC,EC,CON,ID,GT	Implicated food (not feces), blood, exudates	5ml blood	Store and ship refrigerated	72-96 hrs
<i>E. coli O157:H7, Other EHECs</i>	AS,CC,EC,ST*,CON,TT,PCR,GT	Stool in fecal transport media or pure culture	>5ml or 5 g stool, or one swab	Store and ship at room temperature transport to lab in 2 hrs.	48-72 hrs
<i>Plesimonas or Aeromonas</i>	CC,EC,CON,ID,GT	Blood, Wound Specimens, feces, Pure culture		No special precautions	48-72 hrs
<i>Yersinia enterocolytica</i>	CC,EC,CON,ID,GT	Stool in fecal transport media or pure culture	>5ml or 5 g stool, or one swab	Store and ship at room temperature transport to lab in 2 hrs.	48-72 hrs
Sexually Transmitted Diseases					

Gonorrhoea	CC,CON,DFA,GP,DS,GT	Swab of Anus, Cervix, Urethra, Vaginal, Throat, Lower RT.		Direct inoculation of MTM or JEMBEC plate: store and ship to lab at room ASAP otherwise incubate plates for 18-24 hrs in 5-10% CO ₂ before sending	48 hrs
Mycology and Parasitology					
Fungal pathogens and allergens	CC,EC,DC,DS,GP,GT	Pure culture	Agar slant	Store and ship at room according to IATA or USPS regulations temperature; packaged	1-3 wks
<i>Cryptosporidium parvum</i>	DFA,CON,ID	Two vial kit w/ 10% formalin and PVA	5mls stool	Place stool into 2 vials immediately: thoroughly mixed w/ solution	72-96 hrs
<i>Giardia lamblia</i>	DFA,OP,CON,ID	Two vial kit w/ 10% formalin and PVA	5mls stool	Place stool into 2 vials immediately: thoroughly mixed w/ solution	72-96 hrs
<i>Cyclospora sp.</i>	DS	Two vial kit w/ 10% formalin and PVA	5mls stool	Place stool into 2 vials immediately: thoroughly mixed w/ solution	72-96 hrs
Ectoparasite identification	DS,ID	Live specimen in container or preserved in alcohol		Do not let specimen dry out	24-48 hrs
Gross examination or worm identification	DS,ID	Worms or portions of worms submitted in 10% formalin		Do not let specimen dry out, indicate source on requisition	24-48 hrs
Blood and tissue parasites	DS,DS*,ID*	Blood smears or EDTA blood	10-15 ml	Submit 2 thick and 2 thin smears, indicate specimen source	24-48 hrs

Other enteric parasites, Protozoa and Worms	OP	Two vial kit w/ 10% formalin and PVA	5mls stool	Place stool into 2 vials immediately: thoroughly mixed w/ solution	72-96 hrs
Pinworm	DS,OP	Paddle from perianal region		Press sticky surface against perianal areas upon waking in morning	24 hrs
Mycobacterial Disease					
Culture for mycobacterium species	CC,EC,ID,CON, GP,GT,AS	Sputum, Respiratory aspirate, BAL, fluids, Tissue	5mls sputum or CSF, 50ml body fluid	First morning sputum recommended; store and ship at room temp or refrigerated	14-21 positive; 6 wk negative

Code Explanation

*	Some or all tests may be referred to another lab.
AS	Antibiotic susceptibility
CC	Clinical culture (Stool, Throat, Blood, etc.)
CON	Confirmation of clinical lab results
DFA	Direct F.A. on clinical materials
DFE	Dark field examination of clinical materials
DS	Direct examination
EC	Environmental culture (Food, Water, Dust, Air, etc.)
EIA	Enzyme-linked immunosorbent assay

Code Explanation

GP	Nucleic acid probe
GT	Nucleic acid typing (PFGE, RFLP etc.)
ID	Identification (Microbial Taxonomy)
OP	Ova & Parasites (Concentration and Trichrome Stain)
PCR	Polymerase chain reaction
ST	Serotyping and serogrouping
TT	Toxin detection in cultures and/or substrates, i.e., food
**	Require notification by telephone, before submission

Analytical Procedures in Environmental Microbiology

Pathogen, Test Type or Disease	Tests or Methods	Refs.	Sample Required	Minimum Volume Required	Special Collection Procedures	Turn-around Time
Algae sent to outside contractor	CTRDT	11:10300	Contact lab	Contact lab	Contact lab	Contact lab
Arthropod identification	EENT	24,25,26	Intact arthropod	Intact arthropod	Place in ethanol or isopropanol	2-5 days
<i>Bacillus cereus</i> , food	FOBAC	11:14	Food	25 g	See page 23	2-5 days
<i>Campylobacter</i> culture, food	FOCPY	11:7	Food	25 g	See page 23	72 hr
<i>Clostridium perfringens</i> , food	FOANP	11:16	Food	25 g	See page 23	72 hr
<i>E. coli</i> by Quantitray (97-tube, single-dilution MPN), DW	9223 B	2,14	Drinking water	100 mL	See page 21	18-24 hr
<i>E. coli</i> by Quantitray (97-tube, single-dilution MPN), environmental	9223 B	14	Recreational & ambient waters, wastewater, sludge	100 mL	See pages 22-23	18-24 hr
<i>E. Coli</i> O157:H7 isolation from environmental sources	FO157	11:4	Food, Water	25 g (food) 100 mL (water)	See pages 21-23	24-96 hr
<i>E. Coli</i> , MTEC medium, environmental	EPA0000	8	Water	100 mL	See pages 22-23	24 hr
Enterococci by membrane filter, ME medium, environmental	9230 C	9	Water	100 mL	See pages 22-23	48 hr
<i>Enterococcus</i> by Quantitray (97-tube, single-dilution MPN), environmental	9230 D	14	Water	100 mL	See pages 22-23	24 hr
Enterotoxin detection, <i>Bacillus cereus</i>	TOXBC	16	Food	25 g	See page 23	24 hr
Enterotoxin detection, Shiga-like toxins, PCR	FOPCR	PCR*	Contact lab	Contact lab	Contact lab	Contact lab

Enterotoxin detection, Shiga-like toxins	TOXEC	19	Contact lab	Contact lab	Contact lab	Contact lab
Enterotoxin detection, <i>Staphylococcus</i>	TOXSA	17	Food	25 g	See page 23	24 hr
Environmental Bacteria, Identification of Yeasts and Molds,	API	6:9610	Contact lab	Contact lab	Contact lab	Contact lab
<i>Escherichia coli</i> by MUG, DW	9223 B	2	Drinking water	100 mL	See page 21	18-24 hr
Fecal coliform, DW	9221 E	1	Drinking Water	100 mL	See page 21	24 hr
Fecal coliform/membrane filter, environmental	9222 D	6:9221E, 9222D	Recreational & Ambient waters	100 mL	See pages 22-23	24 hr
Fecal coliforms, food	FOFC	11:	Food	25 g	See page 23	72-96 hr
Fecal streptococci by membrane filter, KF medium, environmental	9230 C	10				
Filth in food or beverages	FOFLT	11:	Contact lab	Contact lab	Contact lab	Contact lab
Fish sent to contractor	CTRFT	6:10600, 20	Contact lab	Contact lab	Contact lab	Contact lab
Food standard plate count	FOSPC	11:3	Food	25 g	See page 23	48 hr
Food Utensil and Surface Counts	FOHPC	23:3	Swab in transport medium		See page 23	48 hr
Food, direct smears and sample prep	FODSP	11:1&2	Contact lab	Contact lab	Contact lab	Contact lab
<i>Giardia</i> and/or <i>Cryptosporidium</i> in drinking water	EPA1623	6:9711	Water	10 L	Contact lab	48 hr
Heterotrophic plate count, drinking water	9215 B	6:9215	Drinking water	100 mL	See page 21	5 days
Heterotrophic plate count, environmental	9215 B	6:9215	Environmental water	100 mL	See page 22-23	5 days
<i>Legionella sp./environmental</i>	9260 J	12:9260	Contact lab	Contact lab	Contact lab	Contact lab

<i>Listeria monocytogenes</i> isolation from environmental sources	FOLIS	11:10	Food	25 g	See page 23	2-5 days
Macroinvertebrates sent to contractors	CTRCT	6:10500, 21,22	Contact lab	Contact lab	Contact lab	Contact lab
Microscopic Examination, Basic	9240	6:10200,	Contact lab	Contact lab	Contact lab	Contact lab
Microscopic particle analysis (MPA) sent to contractor	WMPA	9	Contact lab	Contact lab	Contact lab	Contact lab
Most probable number fecal coliform, environmental	9221 E	6:9221	Water	100 mL	See pages 22-23	72 hr
Most probable number total coliform, environmental	9221 B	6:9221	Water	100 mL	See pages 22-23	72-96 hr
M.P.N., sludge, environmental	ESLG	3	Sludge/Water	100 mL	See page 22	72 -96 hr
Nuisance Bacteria (Odor, Sulfur, or Iron)	9240	6:9240	Contact lab	Contact lab	Contact lab	Contact lab
Presence/absence test, drinking water	9221 D	1	Drinking water	100 mL	See page 21	48-96 hr
<i>Pseudomonas aeruginosa</i> , environmental	9213 F	6:9213	Water	100 mL	See pages 22-23	72 hr
Residual chlorine	9260 B	13	Water	100 mL	See pages 22-23	72 hr
<i>Salmonella</i> or <i>Shigella</i> , food	ESAL	12:9260	Food	25 g	See page 23	3-5 days
<i>Salmonella</i> or <i>Shigella</i> , food	FOSAL	6:9231B	Water	100 mL	See pages 22-23	48 hr
<i>Staphylococcus</i> count or MPN, food	FOSC	6:9231B	Food	25 g	See page 23	2-5 days
<i>Staphylococcus</i> count or MPN, food	9223 B	2,14	Drinking Water	100 mL	See page 21	18-24 hr
Total coliform by Quantitray (97-tube, single-dilution MPN), DW	9223 B	14	Environmental water	100 mL	See pages 22-23	18-24 hr

Total coliform, DW, membrane filter	9222 B	1	Water	100 mL	See pages 21-23	1-5 days
Total coliform, DW, MMO-MUG	9223 B	1	Drinking water	100 mL	See page 21	18-24 hr
Total coliform, DW, MMO-MUG	9221 B	1	Water	100 mL	See page 21	2-4 days
Total coliform, environmental	9222 B	1	Environmental water	100 mL	See pages 22-23	1-5 days
Total coliforms, food	EMF	12:9221 A-E, 9222	Food	25 g	See page 23	48 hr
Total coliforms, food	FOTC	11:4, 23:5	Food	25 g	See page 23	48-96 hr
<i>Vibrio species in food</i>	FOYM	11:18	Contact lab	Contact lab	Contact lab	Contact lab
Yeast or Mold in water	EYM	11:18	Contact lab	Contact lab	Contact lab	Contact lab
Yeast or Mold in water	EYM	12:9610	Food	25 g	See page 23	3-10 days

Explanation of References

(1) 40 CFR Part 141. 1989. Safe Drinking Water Act. National Primary Drinking Water Regulations; Total Coliforms (Including Fecal Coliforms and *E. coli*).

(2) 40 CFR Part 141. 1992. Safe Drinking Water Act. National Primary Drinking Water Regulations, Analytical Techniques Coliform Final Rule.

(3) 40 CFR Part 503 Subpart D. 1992. Standards for the use of disposal of sewage sludge rule.

(4) BioMérieux. 1996. Manufacturers Instructions API 20 E System 07564B-09/96. API.

(5) BioMérieux. 1996. Manufacturers Instructions API 20 Strep 07557E-12/96.

(6) Eaton, A.D., Clesceri, L.S. and A.E. Greenberg, eds. 1995. Standard methods for the analysis of water and wastewater. 19th ed. American Public Health Association. Washington DC. Environmental Monitoring and Support Laboratory, Cincinnati, OH.

(7) EPA 010/9-92-029. 1992. Consensus method for determining groundwater under the direct influence of surface water using microscopic particulate analysis (MPA). Manchester Environmental Lab. Port Orchard, WA.

(8) EPA 1103.1. 1985. *Escherichia coli* in water by the membrane filter procedure.

(9) EPA 600/4-85-076. 1985. Test method *Enterococci* in water by membrane filter procedure. Method 1106.1. Environmental Monitoring and Support Laboratory.

(10) EPA 600/8-78-017. 1978. Microbiological methods for monitoring the environment,

(11) FDA. 1998. Food and Drug Administration bacteriological analytical manual, 8th ed., Revision A. AOAC

International, Gaithersburg, MD. (11:4 indicates chapter 4.)

(12) Green, A.E., Clesceri, L.S. and A.D. Eaton, eds. 1992. Standard methods for the analysis of water and wastewater. 18th ed. American Public Health Association. Washington DC.

(13) Hach. DPD Chlorine Free and Total Chlorine Test Kit Model CN-70 Cat.No. 14542-00. Hach Company, Loveland CO.

(14) IDEXX. Colilert Manufacturers Instructions CLT 100/50 06-01701-03.

(15) IDEXX. Enterolert Manufacturers Instructions ELT 06-02150-03.

(16) OXOID. 1990. BCET-RPLA A kit for the detection of *Bacillus cereus* enterotoxin (diarrhea type) in foods and culture filtrates by reversed passive latex agglutination. TD950. Unipath Limited, Hampshire, England.

(17) OXOID. 1995. SET-RPLA A kit for the detection of Staphylococcal enterotoxins A,B, C, and D in food samples or culture filtrates by reversed passive latex agglutination. Unipath Limited, Hampshire, England.

(18) VIP. 1997a. Visual Immunoprecipitate Assay one-step for the detection of *Listeria monocytogenes* and related *Listeria* species in foods, ingredients, and environmental samples. AOAC Official Method 997.03 BioControl Systems, Inc. Bothell, WA

(19) VIP. 1997b. Visual Immunoprecipitate Assay one-step for the detection of enterohemorrhagic *E. coli* (EHEC) in foods, ingredients, and environmental samples. AOAC Official Method 996.09 BioControl Systems, Inc. Bothell, WA

(20) Simpson, J.C. & R.L. Wallace. 1978. Fishes of Idaho, University of Idaho Press, Moscow.

(21) Plotnikov, R.W. & J.S.White, 1966, Taxonomic Laboratory Protocol for Stream Macroinvertebrates Collected by the Washington State Department of Ecology. DOE Publication No. 96-323, Olympia.

(22) Department of Ecology, State of Washington, 1994, Instream Biological Assessment Monitoring Protocols: Benthic Invertebrates, DOE 94-113, Olympia.

(23) Speck, M.L., ed. 1984, Compendium of methods for the microbiological examination of foods, American Public Health Association, Washington.

(24) Borror, D.J., C.A.Triplehorn, & N.F.Johnson. 1989. An introduction to the study of insects, 6th Ed., Saunders, Philadelphia.

(25) CDC, 1994, Pictorial keys: arthropods, reptiles, birds and mammals of public health importance. U.S. Department of Health and Human Services, Centers for Disease Control, Atlanta.

(26) R.W.Merritt & K.W. Cummins. 1996. Aquatic Insects of North America, 3rd. Ed.. Kendall/Hunt, Dubuque.

(27) Pennak, R.W. 1989. Fresh-water invertebrates of the United States, 3rd Ed., John Wiley & Sons, New York.

(28) Thorp, J.H. & A.P.Covich. 1991. Ecology and classification of North American freshwater invertebrates, Academic Press, New York.

ENVIRONMENTAL MICROBIOLOGY SAMPLE HANDLING AND PRESERVATION GUIDE

Unless you are very sure that no enforcement action or legal issue is involved, always fill out the chain-of-custody portion of the form, or include your own or your agency's or company's chain-of-custody form.

In any case, fill out the form and sample container label so completely and clearly that anyone can interpret it in your absence.

- Wilson's sink, tacos, or Birch Creek are **NOT** adequate.
- Carl Wilson kitchen sink, 2234 W. Gorky Place, Homedale, ID. **IS** adequate.
- Tacos taken from the 4:30 PM Lot at Casa de Tacos, Store #334, 2576 12th Ave. Road, Nampa, ID **IS** adequate.
- Wilson Creek, Riffle at mile 24, 60 Meters upstream from "Farmer's Lateral" Flume, Oneida county, ID. T5N, R34E, S22. **IS** adequate.

Use a Sharpie® or other waterproof pen to label bottles. Use a ball or roller point pen to fill out forms.

Most sampling materials are available from our laboratories, unless otherwise stated.

Follow the recommendations above and below, exactly, if there is any doubt that the sample may have legal or political overtones.

Drinking Water:

1. Fill out the label on the bottle, the request form, and the chain-of-custody form
2. Select a clean faucet. Avoid collecting from a swivel or hinged faucet, since bacterial regrowth can occur in cracks and recesses
3. Remove all screens or strainers before taking the sample.
4. Allow the water to run for five minutes before taking the sample.
5. DO NOT remove the cap from the bottle until just before taking the sample. While you are filling the bottle, hold onto the cap so that neither the lip of the bottle nor the inside surface of the cap touch anything, especially your fingers. Fill the bottle leaving 1" between the top of the water and the rim of the bottle. Generally, this means do not fill the bottle beyond the shoulder. This space is critical to the test. Samples may be invalid if the bottles are under or over filled.
6. Coliform test samples must reach the laboratory within 30 hours. Samples older than

30 hours. will not be tested in other than exceptional cases (immediate threat to life or property). Samples that are rejected must be resampled.

7. Samples for Heterotrophic Plate Count (HPC) must reach the laboratory, so that the test can be set up within 8 hours.

8. If possible, keep the sample refrigerated or on ice until you turn it over to the laboratory.

Reference

Green, A.E., Clesceri, L.S. and A.D. Eaton, eds. 1992. Standard methods for the analysis of water and wastewater. 18th ed. American Public Health Association. Washington DC. (Part 9060.A.3.a)

Sludge or Sewage-contaminated Soil:

1. Pick eight representative sampling sites in a pile of sludge or compost. Divide the pile into eight sections, four per side. Thrust a spade shovel vertically into the middle of each section of the pile to a depth of .37 M (12 in.). Pull the shovel toward you to clear a freshly exposed sampling area.
2. Partially unwrap sterile scrapers. Remove one and use it to scrape off the top 2.5 cm. (1 in.) of material from the cleared section.
3. Unwrap a sterile spoon or scoop and scoop a sample from the scraped area. Place the sample in a Whirl-Pak[®] bag or pre-sterilized, straight sided, polyethylene bottle.
4. Repeat steps 1-3 until all eight areas of the pile have been sampled. The same scoop can be used for all eight areas, but a new scraper must be used on each section.
5. Fill the sampling container no more than 1/3 to 1/2 full. Be sure not to touch the inside of the bag or bottle with your hands as you put the sample in the container.
6. Seal the bag or bottle and bring it to the laboratory in a cooler on ice. The sample should be analyzed within six hours or refrigerated until analyzed.
7. In many cases, especially if the sample is for informational use, the collector may want to do a "grab" sample at a single site. In this case follow steps 1-3, filling the bag or bottle no more than 1/2 full. Never do a simple grab. A simple grab sample would probably be very weak evidence in any legal action.

Reference

40 CFR 503, Subpart D.

Water Samples from Streams, Ponds or Lakes:

1. Grab samples: Fill out the request form, chain-of-evidence form, and bottle label,

identifying the sampling site completely.

- a. Open the bottle, being careful to touch nothing with the inside of the cap or the rim of the bottle.
- b. Hold the bottle by the bottom 1/3.
- c. Plunge the bottle, neck downward, into the water until it is submerged.
- d. Tilt the bottle upward until it fills. The bottle neck must be tilted in the upstream direction. If there is no current, then you must move the bottle in the direction of the neck to create one. If you are sampling from a boat, you must sample at the bow of the boat, if it is moving, or the upstream side of the boat, if it is anchored.
- e. In all cases water must reach the mouth of the bottle before it flows over your hand, or any other introduced object.
- f. Avoid stream banks and beds. Any introduction of sediment from the bottom or side will foul the sample.

2. Sampling apparatus: Sampling from bridges or docks or sampling at different depths in water bodies, requires specialized samplers or bottle racks. These are not provided by the laboratory. In every case, the sample bottle must be sterile for bacteriological test to be run. These apparatus are more fully described in the references.

3. Beaches and other Recreational water: Samples should be taken from a random set of points, at a depth of one meter. Samples should be taken from the water-beach interface, because young children are exposed to this area. In order to reflect the entire recreational zone, consider collecting samples from peripheral areas, from upstream sites, and from any nearby drain or run-off channel that might introduce contamination.

References

1. Green, A.E., Clesceri, L.S. and A.D. Eaton, eds. 1992. Standard methods for the analysis of water and wastewater. 18th ed. American Public Health Association. Washington DC. (Part 9060.A.3.c,d,e,f,g)
2. EPA 600/8-78-017. 1978. Microbiological methods for monitoring the environment, Environmental Monitoring and Support Laboratory, Cincinnati.

Food:

1. Whenever possible, submit unopened, original containers. If a food poisoning is involved, these must be from the lot consumed by victims. If sample containers are

too large, submit a representative portion.

2. Always use sterile sampling tools and containers. Always use aseptic technique.
There can be no compromise on this.

3. Use containers that are clean, dry, leak-proof, wide-mouthed, and sterile.

4. Include a container that has been opened then closed at the sampling site, but has no sample (a), a closed sampling container that has not been opened (b), and a container that contains a food, or plain water that will be shipped with the samples for testing (c). Samples (a) and (b) are sterility controls. Sample (c) is a temperature control.

5. Submit the samples to the laboratory as soon as possible. Maintain the original storage condition. For example, if the food is frozen, make sure it stays solidly frozen until it reaches the laboratory.

6. For suspected *Campylobacter* or *Clostridial* food contamination express as much air as possible from the sample container if possible. These organisms are sensitive to oxygen.

7. More thorough information on sampling food, sampling plans and sample handling can be found in the FDA Inspections Operations Manual.

Reference

1. FDA. 1998. Food and Drug Administration bacteriological analytical manual, 8th ed. AOAC International, Gaithersburg, MD. (Chapter 1)

2. FDA. 1993. Food and Drug Administration Inspections Operations Manual, FDA, Rockville, MD.

Analytical Methods in Organic Chemistry*

Note: Due to unforeseen event, the Organic Laboratory is not yet fully operational. The methods list below will be subject to change until the lab is fully operational.

Contaminant Class or Test Type	Tests or Method Offered	Sample Required*	Minimum Volume Required**	Special Collection Procedures	Turn-around Time
BTEX	602,8020	40ml	Water**	40 ml VOA vial	14 days
Carbamates	531.1	125 ml	Water**	125 milliliter. bottle	14 days
Chlorophenoxy Herbicides	515.3, 515.2, 515.3, 615, 8150	1 liter	Water**	4 ounce jar for solid samples, or 1 Liter bottle for water of other liquids	1 month
Diquat/Paraquat	549.1	500 ml	Water**	500 milliliter plastic bottle	
EDB/DBCP	504.1	40 ml	Water**	40 milliliter amber glass vial	14 days
Endothall	548.1	1 liter	Water**	1 Liter glass bottle	1 month
GC/MS Scan	In-house method	2 liters	Water**	4 ounce jar for solid samples, or 1 Liter bottle for water of other liquids	1 month
Glyphosate	547	60 ml	Water**	40 milliliter amber glass vial	14 days
OCI Pesticides	508, 525.2, 608, 625, 8080, 8270	1 liter	Water**	4 ounce jar for solid samples, or 1 Liter bottle for water of other liquids	1 month
OP Pesticides	525.2,612, 625, 8270	1 liter	Water**	4 ounce jar for solid samples, or 1 Liter bottle for water of other liquids	1 month
PAH	525.2, 550.1, 610, 625, 8310, 8270	1 liter	Water**		1 month
PCB Oil	8081	40 ml	Water**		1 month
PCBs	508, 508A, 525.2, 608, 625, 8080, 8081, 8270	1 liter	Water**	4 ounce jar for solid samples, or 1 Liter bottle for water of other liquids	1 month
Pentachlorophenol (PCP) only	8270, 525.2	1 liter	Water**		1 month

Phenols	515.2, 515.3, 515.4, 604, 625, 8040, 8270	1 liter	Water**	4 ounce jar for solid samples, or 1 Liter bottle for water of other liquids	1 month
Phthalates only	525.2, 625, 8260, 8270	1 liter	Water**	4 ounce jar for solid samples, or 1 Liter bottle for water of other liquids	1 month
RCBA PAH	8021	1 liter	Water**		14 days
RCBA VOC	8021		Water**	40 ml VOA vial	14 days
TCLP Pesticides	1311	2 liters	Water**	4 ounce jar for solid samples, or 1 Liter bottle for water of other liquids	1 month
TCLP Volatiles (ZHE)	1311	1 liter	Water**	4 ounce jar for solid samples, or 1 Liter bottle for water of other liquids	1 month
TPH (Cal)	8015	1 liter	Water**	4 ounce jar for solid samples, or 1 Liter bottle for water of other liquids	14 days
TPH (IR method) ***		1 liter	Water**	4 ounce jar for solid samples, or 1 Liter bottle for water of other liquids	14 days
VOC full list	502.2, 8021	40 ml	Water**	40 milliliter amber glass vial	14 days
VOC halogenated only	601, 8010	40 ml	Water**	40 milliliter amber glass vial	14 days
VOC aromatics only	602, 8020	40 ml	Water**	40 milliliter amber glass vial	14 days
Drinking Waters Regulated Organic Contaminants	Contact the section for specific methods available	2 liters	Water**	Liquids: 2, 1-liter bottle or Solids: 4 oz. jars	1 month
Unregulated Organic Contaminants	Contact the section for specific methods available	2 liters	Water**	Liquids: 2, 1-liter bottle or Solids: 4 oz. jars	1 month

Regulated VOCs	Contact the section for specific methods available	40 ml	Water**	40 milliliter amber glass vial	14 days
Unregulated VOCs	Contact the section for specific methods available	40 ml	Water**	40 milliliter amber glass vial	14 days

This is a very short example of the tests available in organic chemistry. Please contact the section manager with specific questions.

* Samples required are for water testing

** All other matrices (soils, sludges, vegetation and others) should be submitted in a 4 oz. jar.

*** This testing is not currently performed by the Idaho Bureau of Laboratories

Collection Containers:

Sample containers for organic chemicals must be scrupulously clean, because residues of industrial and natural chemicals contaminate them, and render the data useless. Washing a container, for instance, in a home dishwasher is not enough. We strongly recommend that you use only containers provided by the laboratory for any testing for organic contaminants.

These recommendations are for only a few of the commonest classes of compounds.

Analytical Methods in Inorganic Chemistry

Note: Turn Around Time is a general range; most tests can be completed within 2-3 days upon request. Contact the Lab before submitting the sample if a result is needed sooner than the listed time.

Test Type or Condition	Method	Source ¹	Sample Required (blood, serum...etc)	Minimum Volume Required	Special Collection Procedures	Turn-around Time
Alkalinity	310.1	1	Water	250 mL	4° C	2 Weeks
Ammonia, N	350.1	1	Water	250 mL	H ₂ SO ₄ pH <2, 4° C	2 Weeks
Ammonia-N, soil or sediment	I-6523-78	8	Soil	4 oz Jar	4° C	2 Weeks
Antimony	3113B, 200.92, 200.72	10,2	Water and Other Various, Contact Lab	100-500 mL	HNO ₃ pH <2, 4° C	3 Weeks
Arsenic	3113B, 200.9, 200.7	10,2	Water and Other Various, Contact Lab	100-500 mL	HNO ₃ pH <2, 4° C	3 Weeks
Barium	3111D, 200.7	10,2	Water and Other Various, Contact Lab	100-500 mL	HNO ₃ pH <2, 4° C	3 Weeks
Beryllium	3113B, 200.7, 200.9	10,2	Water and Other Various, Contact Lab	100-500 mL	HNO ₃ pH <2, 4° C	3 Weeks
BOD	405.1	1	Water	1 L	4° C, 48 Hr holding time.	2 Weeks
Boron	212.3	1	Water and Other Various, Contact Lab	100-500 mL	HNO ₃ pH <2, 4° C	3 Weeks
Bromate	300.1	1	Water	250 mL	EDA, 4° C	1 Week
Bromide	300.1	1	Water	250 mL	None Required	1 Week
Cadmium	3113B, 200.9, 200.7	10,2	Water and Other Various, Contact Lab	500 mL	HNO ₃ pH <2, 4° C	3 Weeks
Calcium	3111D, 200.7	10,2	Water and Other Various, Contact Lab	100-500 mL	HNO ₃ pH <2, 4° C	3 Weeks
Chlorate	300.1	1	Water	250 mL	EDA, 4° C	1 Week
Chloride	300.0	1	Water	250 mL	4° C	2 Weeks

Chlorite	300.1	1	Water	250 mL	EDA, 4° C, Opaque Bottle	1 Week
Chlorophyll a + pheophytin	10200 H	5	Water	Various	Filtered, wrapped in foil and frozen	3 Weeks
Chromium	3113B, 3111D, 200.9, 200.7	10,2	Water and Other Various, Contact Lab	100-500 mL	HNO ₃ pH <2, 4° C	3 Weeks
Cobalt	3111B, 3113B, 200.9, 200.7	10,2	Water and Other Various, Contact Lab	100-500 mL	HNO ₃ pH <2, 4° C	3 Weeks
COD	410.1, 410.2	1	Water	500 mL	4° C	2 Weeks
Copper	3111B, 200.7	10,2	Water and Other Various, Contact Lab	100-500 mL	HNO ₃ pH <2, 4° C	3 Weeks
Cyanide	335.2	1	Water and Other Various, Contact Lab	200 mL	4° C, pH < 12, NaOH Opaque Bottle	14 days
Cyanide, Weak acid dissociable	4500-CNI.	5	Water and Other Various, Contact Lab	200 mL	4° C, pH <12 NaOH Opaque Bottle	14 days
Fish tissue metals	Metals testing previously listed. Sample digestion procedure developed in-house	10,2	Fish Tissue 4° C	Various	Frozen	1 Month
Flashpoint	1010, Pensky-Martens Closed Cup SW-846	3	Volatiles	250 mL	4° C	3 Weeks
Fluoride	300.0	1	Water	250 mL	4° C	2 Weeks
Gross Alpha & beta activity	900	11	Water and Other Various, Contact Lab	1 L	pH < 2, 3 N Nitric Acid	2 Weeks
Hardness	130.2	1	Water	250 mL	HNO ₃ pH <2, 4° C	2 Weeks
Hydrolyzable phosphorus as P	365.2	1	Water	250 mL	4° C	2 Weeks

Iron	3111B, 200.7	10,2	Water and Other Various, Contact Lab	100-500 mL	HNO ₃ pH <2, 4° C	3 Weeks
Lead	3111B, 3113B, 200.9, 200.7	10,2	Water and Other Various, Contact Lab	100-500 mL	HNO ₃ pH <2, 4° C	3 Weeks
Magnesium	3111B, 200.7	10,2	Water and Other Various, Contact Lab	100-500 mL	HNO ₃ pH <2, 4° C	3 Weeks
Manganese	3111B, 200.7	10,2	Water and Other Various, Contact Lab	100-500 mL	HNO ₃ pH <2, 4° C	3 Weeks
Mercury	245.1	1	Water and Other Various, Contact Lab	500 mL	HNO ₃ pH <2, 4° C	3 Weeks
Molybdenum	3113B10, 200.7	10,2	Water and Other Various, Contact Lab	100-500 mL	HNO ₃ pH <2, 4° C	3 Weeks
Nickel	3111B, 3113B, 200.9, 200.7	10,2	Water and Other Various, Contact Lab	100-500 mL	HNO ₃ pH <2, 4° C	3 Weeks
Nitrate + Nitrite N soil or sediment	I-6545-78	8	Soil	250 mL	4° C	2 Weeks
Nitrate, N	353.2	1	Water	500 mL	4° C, 48 Hr holding time	1 Week
Nitrite + Nitrate, N	353.2	1	Water	250 mL	H ₂ SO ₄ pH <2, 4° C	2 Weeks
Nitrite, N	353.2	1	Water	250 mL	4° C, 48 Hr holding time	1 Week
Oil and Grease	413.1	1	Water	1 L	HCl pH <2, 4° C	3 Weeks
Organic carbon in soil, dichromate method	Black, CiA; Methods of Soil Analy- sis, Part 2; Agronomy 9:1346-1365, 1965.		Soil	4 oz Jar	4° C	3 Weeks

References:

1. U.S. EPA "Methods for Chemical Analysis of Water and Wastes" EPA-600 4-79-020;
March, 1983

2. U.S. EPA; "Methods for the Determination of Metals in Environmental Samples"; EPA-600/4-91-010 Available at NTIS PB91-231498; June, 1991
3. U.S. EPA; "Test Methods for Evaluating Solid Waste" SW-846; Office of Solid Waste and Emergency Response; Washington D.C. 20460; November, 1986
- 4 "Techniques in Graphite Furnace Atomic Absorption Spectrophotometry" Perkin-ElmerCorp., Ridgefield CT, 1985
5. Standard Methods for the Examination of Water and Wastewater; American Public Health Association; Washington, D.C. 20005, 17th edition
6. Hach Water Analysis Handbook, 2nd ed; Tannin and Lignin Tyrosine Method; Hach Company Loveland CO; 1992 p 637
7. E. Bergersen and K. Hamilton, Colorado State University, Colorado Cooperative Fishery Research Unit, No date
8. U.S. Geological Survey "Methods for Determination of Inorganic Substances in Water And Fluvial Sediments" U.S. Government Printing Office, 1979
Stock Number 024-001-03177-9
9. U.S. EPA, "Quality Assurance Handbook for Air Pollution Measurement System," Vol. II, Ambient Air Specific Methods EPA-600/R-94/0386, April 1994
10. Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF 18th edition 1992
11. U.S. EPA "Procedures for Measurement of Radioactivity in Drinking Water" EPA-600 4-80-032; August, 1980

INORGANIC CHEMISTRY SAMPLE HANDLING AND PRESERVATION GUIDE

WATER SAMPLES:

Key: quantity; container; preservation; minimum holding time; miscellaneous

Water samples for inorganic chemistry are generally collected in one-liter plastic or glass containers. All bottles must be thoroughly cleaned and rinsed with reagent water. Volume collected should be sufficient to insure a representative sample, allow for replicates analysis, if required and minimize waste disposal. One container is recommended for each preservative type. Samples do not need to be preserved if submitted within 48 hours. These samples will be preserved in house.

Biological Oxygen Demand and Settleable Solids must have no preservative, and must be kept cool (4°C.). If both BOD and settleable solids are requested for a sample site submit one container of sample for each test. The maximum holding time for these tests is 48 hrs.

Metals Collect water in a 1 liter container with 1.5 ml conc. nitric acid per liter. Holding time for these samples is 6 months, with the following exceptions, for mercury 28 days, and for chromium ⁺⁶ 24 hours. If you want dissolved metals the sample must be filtered through a 0.45 µM membrane filter. It is recommended that this be completed in the field. If that is not available, we can filter the sample for you and note it on the report form.

COD, Ammonia, Total NO₂+NO₃, Total Kjeldahl-Nitrogen, Total Phosphorus, Total Hydrolyzable Phosphorus Submit samples in one liter container with 2 ml sulfuric acid per liter. These samples must be kept cool. The holding time is 28 days.

Residue Use a one-liter container. Keep the sample cool. Holding time is 7 days except settleable residue, which is 48 hours.

Cyanide Use a one-liter opaque container with 2ml 10 N sodium hydroxide solution. Samples must be kept cool (4°C.). The holding time is 14 days. See EPA Region 10 sampling protocol. The weak acid dissociable procedure gives complete recovery from all but one of the simple cyanides without decomposing the complex cyanides.

Oil and Grease Use a one liter glass bottle with 2 ml Hydrochloric Acid per liter. Keep cool. Holding time: 28 days.

Surfactants (Detergents) One-liter; cubitainer[®]; cool 4 C; 48 hours.

Sulfide One-liter; cubitainer; 2ml 1N zinc acetate solution, cool 4 C; seven days.

Radiological Same as metals.

Chlorophyll a Filter a measured portion of surface water through a 4.25 cm, GF/C or GF/A glass fiber filter at the sample site. Place the filter in a 50-mm, plastic, disposable petri dish labeled with sample location and volume of water filtered. Ideally, filter a liter of sample. In many instances the condition of the sample will not allow that volume to be filtered. Filter as large a volume of sample as possible

without plugging the filter disk. A large volume improves the accuracy and precision of the determination. The petri dish must be wrapped in aluminum foil to exclude light then frozen. The samples must be shipped iced.

Scrapings from microscope slides removed from periphyton samplers or scrapings from natural substrates can be rinsed onto glass fiber filters with deionized water and shipped similarly to filters used to collect periphyton from water samples.

All Others One liter will be sufficient for all analytes requested. Most holding times are seven days or greater with the exception of ortho phosphate and nitrite which have 48 hour hold times.

SOIL SAMPLES: (excluding hazardous materials)

Twenty grams (quarter of a cup) of sample should be sufficient for any single analyte or for metals testing representing a single sample site. (Multiple metals are tested from a single digest). No preservation is necessary.

FISH TISSUE METALS:

Submit whole fish wrapped in aluminum foil. Keep the fish frozen. Ship on dry-ice if possible. Metals routinely determined on muscle tissue on a dry-weight basis. Analysis requires multi steps. Therefore, testing turnaround time can be lengthy depending upon the number of samples submitted.

HAZARDOUS MATERIALS:

Flashpoint Samples must be liquid. Minimum volume 200 ml (7 fluid ounces). No preservation required. Use a glass container and cap id tightly.

TCLP The sample requirements vary with the solid fraction of the waste. For samples which appear to be solids, 300 grams is the minimum sample size (approximate 10 ounce bottle). For multi-phase samples the minimum sample size varies. Use the following guidelines.

Guidelines

Solids	10 ounces	(300 ml)
Three phase (organic, water, solid)	2.6 quarts	(2500 ml)
Little or no solids	2.6 quarts	(2500 ml)
Liquid/solids 75%/25%	1.25 quarts	(1200 ml)
Liquid/solids 50%/50%	1.25 quarts	(1200 ml)
Liquid/solids 25%/75% (or more)	2.1 quarts	(2000 ml)

pH Samples must be aqueous or when multiphasic, the aqueous phase must be at least 20% volume. A

minimum of 750ml (0.8 quart) is required for liquid samples. Solid samples can be tested. The minimum sample size is 450 gram (one pound).